

REMARKS

Claims 1-9, 11, 13-23, 28-29, 31-33, 35-36, 38-40, and 42-59 are pending, with claims 1, 7, 11, 15, 19, 28-29, 31-33, 35-36, and 38-40, being independent.

Claims 22-23 and 56-57 are being cancelled.

Claims 3, 6, 9, 11, 13, 21, 29, 31, 36, 38, 43, 46, 48-50, 55, and 59 are being amended. The amendments to claims 3 and 43 are supported, for example, by the language of the specification in the paragraph beginning on line 15 of page 17. Claims 6, 9, 11, 21, 46, 48, and 55 are being amended for clarity. Claims 13 and 49-50 are being amended to correct clerical errors. Claims 29 and 36 are being amended to recite features corresponding to the features of claim 7, as amended in the response to Action mailed September 22, 2006. The amendments to claims 29 and 36 are supported, for example, by the language of the specification in the paragraphs beginning on line 8 of page 5 and line 15 of page 6. Claims 31 and 38 are being amended to recite features corresponding to the features of claim 11, as amended in the response to Action mailed April 8, 2004. The amendments to claims 31 and 38 are supported in the specification, for example, by Figures 1A, 1B, and 1C. The amendment to claim 59 is supported by the language of the specification in the paragraph beginning on line 12 of page 8.

New claims 60-77 are being submitted. New claims 60-61 recite the features of method claims 58-59, respectively. New claims 62-77 recite features corresponding to those of method claims 2-6, 8-9, 13-14, 16-18, 20-21, and 58-59, respectively. No new matter has been added.

Reconsideration of the action and allowance of the claims are requested in light of the foregoing amendments and the following remarks.

Section 101 Rejections

Claims 19-23, 33, and 54-57 are rejected under 35 U.S.C. § 101 as allegedly being directed to non-statutory subject matter.

To explain the rejection, the examiner writes:

The current focus of the Patent Office in regard to statutory inventions under 35 U.S.C. § 101 for method claims and claims that recite a judicial exception (software) are that the claimed invention recite a practical application. Practical application can be provided by a physical transformation or a useful, concrete and

tangible result. No physical transformation is recited and additionally, the final result of the claim is "...calculating the dependency among objects in the set of objects dynamically at the time objects calculate their values..." which is not a tangible result because it does not indicate the usefulness of the process, for instance having the dependency objects accumulated or stored for later use after the calculating step.

The applicant respectfully disagrees. The tangible result requirement of MPEP 2106 IV(C)(2)(2)(b) relied upon by the examiner, is only considered when determining whether the claim recites a practical application of an abstract idea, law of nature, or natural phenomenon, which are judicial exceptions to section 101. *See* MPEP 2106 IV(C)(2). Contrary to the examiner's suggestion, software is not a judicial exception to section 101. *See* MPEP 2106 IV(C). Before the tangible result requirement can even be considered, it is first necessary that the claim, as a whole, falls within these judicial exceptions to statutory subject matter under section 101. *See* MPEP 2106 IV(C).

The claimed methods, systems, and computer program products do not fall within the judicial exceptions to section 101. Methods, systems, and computer program products for managing dependency among a set of objects in a computer program are not abstract ideas. For example, MPEP 2106 IV(C) cites mathematical algorithms as abstract ideas. The section further goes on to describe principles and motives as similarly unpatentable. These are abstract concepts that an individual cannot claim exclusive right to. Methods, systems, and computer program products for managing dependency among a set of objects in a computer program are none of these things. To the contrary, the claimed methods, systems, and computer program products by their nature are tangible things, quite distinct from an idea or mathematical formula. Furthermore, calculating the dependency among objects in the set of objects dynamically, as recited in the claims, is a useful and concrete result that has patentable weight. The examiner has failed to provide any explanation as to why any of the claims 19-21, 33, and 54-55 as a whole are directed to an abstract idea. Without establishing this, it is improper to consider the tangible result requirement, which is only applied after showing that the claim is directed to an abstract idea, law of nature, or natural phenomenon.

The applicant submits that claims 19-21, 33, and 54-55 are directed to statutory subject matter and the rejection of claims 19-21, 33, and 54-55 under section 101 should be withdrawn.

Section 103 Rejections

Claims 1-9, 11, 13-18, 28-29, 31-32, 35-36, 38-39, and 42-53 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 5,929,864 ("Picott") in view of U.S. Patent No. 5,404,428 ("Wu").

Claims 19-23, 33, 40, and 54-57 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Wu in view of U.S. Patent No. 5,526,475 ("Razdow").

Claims 58-59 stand rejected under U.S.C. §103(a) as allegedly being unpatentable over Wu in view of Razdow, as applied to claim 19, and further in view of U.S. Patent No. 5,815,415 ("Bentley").

Claim 1. Claim 1 stands rejected in view of Picott and Wu. Claim 1 recites in part, "when the value of object B changes, invalidating the dependents of object B and all of their further dependents, including severing dependencies among the dependents of object B and all of their further dependents." The relied upon portions of the cited references alone and in combination fail to teach or suggest this feature of claim 1.

The examiner rejected claim 1 applying Picott as follows (*emphasis in original*):

As to claim 1, Picott teaches . . . when the value of object B changes, invalidating the dependents of object B ("...“you are dirty”..." Col. 7 Ln. 35 - 39), including severing dependencies among the dependent of object B and all of their further dependents ("...redraw..." Col. 7 Ln. 35 - 39; NOTE: although severing dependencies are not explicitly taught, it is inherently taught since the node of the directed acyclic graph is invalidated when the node changes and a **redraw** request is initiated. The redraw request indicates that the original directed acyclic graph (i.e. the directed acyclic graph before the change) has been discarded).

The applicant respectfully disagrees. The passage of Picott cited by the examiner, which is set forth below, does not teach severing dependencies among the dependents of object B and all of their further dependents when the value of object B changes (Picott, col. 7, lines 23-35):

When dependency node B changes, it must update dependent node A. In order to achieve this result, dependency node B sends a message to dependency node A stating that "you are dirty" and therefore must update yourself. Dependency node can either ignore this message or respond to this message. When DAG node 230 requests redraw of dependency node A, dependency node A sends an "evaluate me" message to dependency node B. Dependency node B then evaluates and returns results to dependency node A over communication channel 220. Note that dependency node A knows how to control DAG node 230. Thus, when data is returned from dependency node B, dependency node A can pass the data onto DAG node 230.

The relied upon portion of Picott discloses communication between nodes of a dependency graph. Dependency node A is a "wrapper" for a directed acyclic graph (DAG) node 230, where a wrapper is an external data object that presents an interface into the dependency graph for an internal data object. *See* Picott, col. 2, lines 33-38, col. 4, lines 44-46, and col. 7, lines 20-21. The dependency graph of Picott is defined by the set of dependency nodes and the information that flows between the nodes on data pathways. *See* Picott, col. 1, lines 60-62 and col. 4, lines 17-18. When DAG node 230 (an internal data object) "requests redraw of dependency node A" (an external data object), dependency node A sends an "evaluate me" message to dependency node B. Despite the examiner's contention, severing dependencies is not inherently taught by the initiation of the redraw request after dependency node A receives a message saying that it is "dirty" from changed dependency node B. The redraw request does not indicate that the original DAG has been discarded. On the contrary, the fact that dependency node A sends a message to dependency node B and dependency node B responds by returning evaluation results to dependency node A over the communication channel 220 indicates that the dependencies among Picott's dependency nodes are maintained and are not severed.

The secondary reference Wu is not cited for disclosing severing dependencies. Thus, because the examiner has failed to find all the claim limitations in the prior art, the rejection of claim 1 should be withdrawn. Accordingly, claim 1 and its dependents are in condition for allowance. Claims 28, 35, 42-46, and 62-66 include limitations analogous to those of claim 1 and are in condition for allowance for at least the same reason.

Claim 7. Claim 7 stands rejected in view of Picott and Wu. Claim 7 recites in part, "identifying the objects upon which a given object depends as those objects into which the given

object passed itself as a requester during execution of a compute method of the given object.”
The relied upon portions of the cited references alone and in combination fail to teach or suggest this feature of claim 7.

The examiner rejected claim 7 applying Picott as follows:

As to claim 7, Picott teaches . . . identifying the objects upon which a given object depends as those objects into which the given object passed itself as a requester during execution of a compute method of the given object (“...“evaluate me”... ” Col. 7 Ln. 35 - 47) . . .

The applicant respectfully disagrees. The relied upon portion of Picott, discussed above, does not disclose dependency node A passing itself as a requester during execution of a compute method into an object upon which dependency node A depends. The passage of Picott teaches dependency node A sending an evaluation request message to dependency node B. This message from dependency node A to dependency node B cannot be read to teach dependency node A passing itself as a requester into dependency node B. Dependency node A is not passing itself as a requester into any object; it is merely sending a message asking to be evaluated. Therefore, the relied upon portion of Picott does not teach or suggest this feature of claim 7. The cited passages of Wu fail to remedy this deficiency. Thus, because the examiner has failed to find all the claim limitations in the prior art, the rejection of claim 7 should be withdrawn and the claim should be allowed.

Moreover, claim 7 recites “modifying a dependency graph by severing dependencies among dependents of the identified objects with changed value and all of their further dependents to create a modified dependency graph.” The examiner fails to cite any reference for teaching this feature. As addressed above, Picott and Wu fail to teach or suggest severing dependencies among dependents, as required by claim 7. For this additional reason, the rejection of claim 7 should be withdrawn and the claim should be allowed.

Accordingly, claim 7 and its dependents are in condition for allowance. Claims 29, 36, 47-48, and 67-68 include limitations analogous to those of claim 7 and are in condition for allowance for at least the same reasons.

Claim 11. Claim 11 stands rejected in view of Picott and Wu. Claim 11 recites in part, “severing dependencies from the changed object and all of its direct and indirect dependent

objects.” As addressed above, Picott and Wu fail to teach or suggest severing dependencies between nodes of a dependency graph. In particular, the cited portions of the references do not disclose severing dependencies from changed objects and their direct and indirect dependent objects, as required by claim 11. Because the examiner has failed to find all the claim limitations in the prior art, the rejection of claim 11 should be withdrawn and the claim should be allowed.

Accordingly, claim 11 and its dependents are in condition for allowance. Claims 31, 38, 49-50, and 69-70 include limitations analogous to those of claim 11 and are in condition for allowance for at least the same reason.

Claim 15. Claim 15 stands rejected in view of Picott and Wu. Claim 15 recites in part, “for each change registered, traversing a dependency graph from the changing object and . . . for each dependent object on the dependency graph, marking the dependent object as dirty and detaching the dependent object from the dependency graph.”

The examiner again relies on Picott (col. 7, lines 35-39) for teaching detaching dependent objects from the dependency graph. As addressed above, the communication of the redraw request and the return of the evaluation result suggest that the dependencies among Picott's dependency nodes are maintained and are not severed. Labeling the dependency node A as “dirty” cannot be read to teach detaching dependency node A from the dependency graph. The cited passages of Wu fail to remedy this deficiency. Because the examiner has failed to find all the claim limitations in the prior art, the rejection of claim 15 should be withdrawn and the claim should be allowed.

Accordingly, claim 15 and its dependents are in condition for allowance. Claims 32, 39, 51-53, and 71-73 include limitations analogous to those of claim 15 and are in condition for allowance for at least the same reason.

Claims 19-23, 33, 40, and 54-57 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Wu in view of U.S. Patent No. 5,526,475 (“Razdow”).

Claim 19. Claim 19 recites in part, “calculating the dependency among objects in the set of objects dynamically at the time objects calculate their values.”

The examiner conceded that “Wu is silent with reference to the method comprising: calculating the dependency among objects in the set of objects dynamically at the time objects

calculate their values. . .” However, the examiner contended that Razdow remedies the deficiency in Wu.

The relied upon portion of Razdow reads as follows (Razdow, col. 4, lines 63-67, col. 5, lines 1-10, *emphasis added*):

The expression compiler 14 generates a new value of the modified expression. Next, the expression compiler 14 automatically goes down the linked list that represents the numerical dependency graph and marks as "out of date" all expressions that depend on the modified expression. Next, each node that has been marked out of date in turn recalculates itself (with the assistance of the numerical computational engine 18). In performing each recalculation, the node looks up the graph 16 to find the new values of an recalculated nodes (i.e., expressions). When a node is recalculated, the editor automatically updates the document 12. Accordingly, the document 12 is always the most current representation of the nodes of the numerical dependency graph 16. The numerical computational engine 18 has access to a numerical library 20 that is a library of subroutines for performing numerical computations.

The applicant respectfully disagrees. The above quoted passage from Razdow fails to teach or suggest calculating the dependency among objects in the set of objects dynamically at the time objects calculate their values. The dependencies already exist in the dependency graph before the expression is evaluated. This is apparent since the expression compiler 14 traverses “a linked list that represents the numerical dependency graph.” Although Razdow discloses generating a new value for a modified expression automatically, the dependency among the expressions is not calculated dynamically, because the pre-existing linked list is traversed in generating the new value. In other words, the dependency among objects already exists and is not calculated dynamically at the time objects calculate their values, as recited in claim 19.

Accordingly, Wu and Razdow, alone or in combination, do not render claim 19 obvious. For at least this reason, claim 19 and its dependents are in condition for allowance. Claims 33, 40, 54-55, 60-61, and 74-77 include analogous limitations and are therefore in condition for allowance for at least the same reason as claim 19.

Claims 58-59 stand rejected under U.S.C. §103(a) as allegedly being unpatentable over Wu in view of Razdow, as applied to claim 19, and further in view of U.S. Patent No. 5,815,415 (“Bentley”).

Claims 58-59. Claims 58-59 depend from claim 19. As addressed above, Razdow and Wu fail to teach or suggest "calculating the dependency among objects in the set of objects dynamically at the time objects calculate their values," as required by claim 19. The relied upon portion of Bentley fails to remedy this deficiency.

Accordingly, claims 58-59 are in condition for allowance. Claims 60-61 and 76-77 include analogous limitations and are in condition for allowance for at least the same reason.

New Claims 60-77.

Claims 60-61 are dependent claims that depend from claim 40, which has been addressed.

Claims 62-66 are dependent claims that depend from claim 28, which has been addressed.

Claims 67-68 are dependent claims that depend from claim 29, which has been addressed.

Claims 69-70 are dependent claims that depend from claim 31, which has been addressed.

Claims 71-73 are dependent claims that depend from claim 32, which has been addressed.

Claims 74-77 are dependent claims that depend from claim 33, which has been addressed.

Each of the foregoing claims is allowable for at least the reasons set forth above in reference to the claims to which they correspond.

Conclusion


For the foregoing reasons, the applicant submits that all the claims are in condition for allowance.

By responding in the foregoing remarks only to particular positions taken by the examiner, the applicant does not acquiesce with other positions that have not been explicitly addressed. In addition, the applicant's selecting some particular arguments for the patentability of a claim should not be understood as implying that no other reasons for the patentability of that claim exist. Finally, the applicant's decision to amend or cancel any claim should not be understood as implying that the applicant agrees with any positions taken by the examiner with respect to that claim or other claims.

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Respectfully submitted,

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